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Monitoring Distressed Companies through Cash Flow Analysis

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Abstract

The purpose of this paper is to examine the importance of cash flow ratios in determining financial distress companies. Using a logistic regression, this paper analyses the data of 52 distressed and 52 non-distressed companies for three years prior to distress years between 2009 until 2012. The results found that five cash flow ratios are significant predictors of financial distress with the overall predictive accuracy of 82.1 percent. This suggests that cash flow ratios are reliable tools to predict financial distress for Malaysian context.

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Keywords: cash flow ratios; financial distress; logistic regression analysis; Malaysia

1. Introduction

Corporate failure is not an overnight event. It had existed long before it was known to the public. In the United States, the three largest bankruptcies were reported in the early 2000's by Adelphia Communications, WorldCom and Enron Corporation, which were involved in accounting scandals. In the late 2000's, the country once again saw dramatic failures of the Lehman Brothers, Washington Mutual and General Motors (Rodgers,2011). These incidences showed that the income figure on the financial statements had been exposed to manipulation, which affected the various financial statement users who relied on inaccurate information for decision-making.

This problem has also occurred in the Malaysian environment where the reported cases on financial irregularities are normally associated with financially distressed companies. Among the well-known cases in the late 2000's are

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Transmiles Group Bhd, Megan Media Holding Bhd, Axis Incorporation Bhd, Fotronics Bhd, LFE Corporation Bhd, Oilcorp Bhd, HoHup Construction Co. Bhd and Wimems Corporation Bhd. Recently in May 2012, the country was shocked by the discovery of financial irregularities of Silverbird Group Bhd (The Star, 29 May 2012). Financial distress in the Malaysian environment is significantly and positively related to fraudulent financial reporting (Suhaily, Rashidah, and Mahenthiran, 2013).

The current study is motivated by the increasing rate of corporate failure, corporate scandal and financially distressed companies. If the financial distress could be predicted using cash flow ratios, thus the potential of fraudulent financial reporting could also be detected earlier and lessen the impact of potential corporate failure.Therefore, the objective of this study is to examine whether there is a significant relationship between cash flow ratios and financial distress. This paper is organized into five sections. The following section provides a review of the relevant literature followed by data and research methodology used for the current study. Section four provides the discussion on the findings and section five concludes the study.

2. Literature Review

2.1 Definition of financial distress

The previous financial distress prediction studies do not have similar agreement on the term financial distress. There are contradicting ways to define financial distress by various researchers. Financial distress is defined as companies that suffer negative cash flow from operating activities, negative cash flow from investing activities and negative cash flow from financing activities (Jantadej, 2006), default loan payment due to insufficient cash flow (Foster and Ward, 1997; Turetsky and McEwen,2001; Grice and Dugan, 2001; Abid and Zouri,2002; Maux and Morin,2011) , enter into liquidation (Grice and Dugan, 2001), continues to operate under or liquidate under court protection (Foster and Ward, 1997) and filed for bankruptcy (Grice and Dugan, 2001). In short, financial distress is the dynamic process towards corporate failure.

In a Malaysian context, financial distress is defined as companies that are classified under PN17 or GN3 by Bursa Malaysia (Smith, Syahrul and Ahmad, 2004; Tew and Enylina, 2005; Wan Adibah, Raja Nazrin, Khairul Anuar and Rusliza, 2005; Choy, Munusamy, Chelliah and Ally, 2011) and the companies that seek for court protection for restraining order against their creditors and restructured under the Scheme of Arrangement and Reconstruction pursuant to Section 176 (Low, Fauziah and Yatim , 2001; Mohamed, Ang and Ahmadu, 2001; Ong, Yap and Khong , 2011; Yap, Munuswamy and Zulkifflee, 2012). Distressed companies in the current study denote two main criteria, classified as PN17 or GN3 by Bursa Malaysia and seek for court protection under Section 176. These two criteria were selected because the companies that are classified under those criteria can be considered as problematic companies. The companies classified under the second criteria were highly leverage companies because they were helped by the restraining order from the court from being chased by debts.

2.2 Cash flow ratios: Significant predictors of financial distress

The relevance of cash flow ratios to predict financial distress was highlighted by several researchers. The common view by previous literatures on financial distress prediction is that cash flow ratios are significant predictors of financial distress.

As for Ward (1994), the study was conducted to investigate the usefulness of cash flow ratios to predict financial distress of mining, oil and gas companies in the United States. The study used logistic regression analysis up to three years prior the distressed years from 1988 and 1989, which consists of mining, oil and gas companies and other industrial companies. Each of the cash flow components were scaled by total liabilities. The findings suggest that CFFI to total liabilities is the best predictor of financial distress in mining, oil and gas industries while CFFO to total liabilities is the best predictor of financial distress in other industries.

In addition, Murty and Misra (2004) attempted to examine the ability of cash flow ratios to predict corporate failure in India. Their study used factor analysis and Multiple Discriminant Analysis (MDA) one year prior to the actual failure based on 35 failed and 35 non-failed companies from 1977 until 1987.The results showed that CFFO to total assets, CFFO to total liabilities, CFFO to current asset, CFFO to current liabilities and CFFO to capital employed are the significance predictors of corporate failure in India.

Furthermore, Jantadej (2006) investigated the usefulness of various combinations of cash flow ratios to predict financial distress using logistic regression analysis up to three years prior to the financial distress in the United States. The sample consists of 1084 distressed companies and 2798 healthy companies for the period of 2001 until 2004.The study found that four combinations of cash flow are significant predictors of financial distress. The combinations include (1) negative CFFO, positive CFFI and negative CFFF, (2) positive CFFO, negative CFFI and positive CFFF, (3) positive CFFO, negative CFFI and negative CFFF and (4) negative CFFO, negative CFFI and negative CFFF.

A study done by Rodgers (2011) was to examine the usefulness of Multivariant Discriminant Analysis (MDA), logistic regression analysis and operating cash flow analysis in predicting corporate bankruptcy of the 20 largest bankruptcy cases in the United States. The cash flow variables used in his study comprised of cash flow to current asset, cash flow before interest and taxes to current asset and cash flow to current liabilities. The findings suggested that cash flow ratios have significance predictive power to evaluate the company's solvency and logistic regression analysis accurately discriminate bankrupt and potentially bankrupt companies.

In the Malaysian context, a few studies were done by previous researchers found that cash flow ratios are the most significant predictor of financial distress. However, their studies used cash flow ratios in conjunction with other financial ratios to predict financial distress. These include Low et al. (2001), Ong et al. (2011) and Yap et al. (2012).

Continuing this further, Ong et al. (2011) claimed that cash flow to total debt is one of the significant predictor of corporate failure in Malaysia. Their study employed 105 distressed companies and 105 non-distressed companies from seven industries which were classified as distressed companies from 2001 until 2007.The objective of their study was to develop the model that can predict financial distress on Malaysian public listed companies. The cash flow variables used in their study were cash flow from operating activities to total liabilities and cash flow from operating activities to total asset. The first one was found to be a significant predictor of financial distress with an overall percentage of correct 91.5 percent using logistic regression analysis.

Meanwhile, the study conducted by Yap et al. (2012) was to examine the ability of logistic regression to predict financial distress in Malaysia up to five years prior distress years using 32 distressed and 32 non-distressed companies. They found that cash flow from operating activities to total debt is one of the significant predictor of financial distress.

2.2 Cash flow ratios: Not Significant predictors of financial distress

In Malaysia, the studies that used cash flow ratios in conjunction with other financial ratios found that cash flow variables are not considered as significant predictor of financial distress. Among them are Tew and Enylina (2005) and Wan Adibah et al. (2005).

Tew and Enylina (2005) used 84 distressed and 84 non-distressed companies in 2001 and 2002 to test and construct the logistic regression model up to five years before the distress years. The cash flow variables used in the study are cash flow to total liabilities, cash flow to shareholder's equity, cash flow to long-term liabilities, cash flow to total asset and cash flow per share. They found that distressed companies reported lower mean value as compared to non-distressed companies but none of them are significant predictors of financial distress.

Wan Adibah et al. (2005) sought to investigate the usefulness of financial ratios in developing financial distress prediction model using 54 distressed and 54 non-distressed companies from 1993 until 2001.Their study used logistic regression analysis to predict financial distress up to five years prior the distress years. The findings showed that there is a significant difference between the mean value of distressed and non-distressed companies for cash flow from operating activities to total liabilities, but not as a significant predictor of financial distress.

3. Research Methodology

3.1 Sample selection and data collection

The sample adopted in the current study comprised of 52 distressed companies that fall under the financial distress criteria between 2009 until 2012. The sample came from seven industries such as trading/services (16 companies), industrial product (13 companies), technology (11 companies), consumer product (6 companies),

construction (4 companies), plantation (1 company) and properties (1 company).

The current study has undertaken matching procedures to select non-distressed companies, which include similar industry, closest asset size, and similar fiscal years to control bias in selecting the sample. This is consistent with Altman (1968), Platt and Platt (2002), Smith et al. (2004), Murty and Misra (2004), Tew and Enylina (2005), Ong et al. (2011) and Yap et al. (2012).

The data was collected for three years prior the distress years. The distress years used in the current study are from 2009 until 2012. The financial data employed in the current study were extracted from cash flow statements, income statements and balance sheets from 2006 until 2011.

3.2 Dependent and independent variables

The dependent variable in this study is financial distress, which is further categorized into distressed and non-distressed companies. The dependent variable is binary or dichotomous variable where distressed company is coded as 1 and a non-distressed company is coded as 0, which is consistent with Ward (1994), Low et al. (2001),Mohamed et al. (2001),Tew and Enylina (2005), Nur Adiana, Abd Halim, Hamilton and Rohani (2008), Ong et al. (2011) and Yap et al.(2012).

The independent variable used in the current study is the cash flow ratios. The financial data to compute the cash flow ratios was obtained from cash flow statements, income statements and balance sheets of the sample companies. The cash flow ratios employed in the current study comprises of eleven cash flow ratios, which is further classified into four broad categories namely liquidity, solvency, efficiency and profitability. The independent variables used in the current study are summarized in Table 1.

Table 1 . Summary of Cash Flow Ratios

	Descriptions	Acronym	Measurement	Used in prior studies
A	Liquidity Ratio – Measures the company's ability to meet its short-term obligation			
1	Cash flow from operating activities (CFFO) to current liabilities (CL)	CFFO/CL	Measures whether the cash flow from operation is sufficient to meet current obligation.	Casey &Bartczak(1985) Schmidgall et al. (1993) Murty and Misra (2004) Ryu and Jang (2004) Ibarra(2009) Rodgers(2011)
B	Solvency Ratio - Measures the company's ability to serve its obligation in the long run			
2	Cash flow interest coverage - Cash flow from operating activities (CFFO) plus interest expense (I) to interest expense(I)	CFFO+I/I	Measures the company's ability to cover its interest payment on entire debt.	Schmidgall et al. (1993) Ryu and Jang (2004) Jooste(2007) Ibarra(2009)
3	Cash flow from operating activities (CFFO) to total liabilities (TL)	CFFO/TL	Indicates company's ability to cover its total debt with cash.	Casey & Bartczak (1985) Ricci (2003) Murty and Misra (2004) Ryu and Jang (2004) Low et al.(2001) Jooste(2007) Ong et al.(2011) Yap et al.(2012)
4	Cash flow from operating activities (CFFO) to long-term liabilities (LTL)	CFFO/LTL	Indicates the adequacy of cash to pay its long-term debt.	Ibarra(2009)
5	Cash flow from investing activities (CFFI) to total liabilities (TL)	CFFI/TL	Measures the cash generated from investing activities to meet its obligation in the long run.	Low et al.(2001)

6	Cash flow from financing activities (CFFF) to total liabilities (TL)	CFFF/TL	Measures the cash generated from financing activities to meet its obligation in the long run.	Low et al.(2001)
7	Cash flow from operating activities (CFFO) to shareholder's equity (SHE)	CFFO/SHE	Measures the amount of cash generated from shareholders investment and future return on equity.	Ibarra(2009)
C	Efficiency Ratio- Measures the company's ability in using its asset			
8	Cash flow from operating activities (CFFO) to total asset (TA)	CFFO/TA	Indicates the percentage of cash generated from using its total asset.	Murty and Misra (2004) Jooste(2007) Ibarra(2009)
9	Cash flow from operating activities (CFFO) to fixed asset (FA)	CFFO/FA	Indicates the percentage of cash generated from using companies fixed asset.	Ibarra(2009)
D	Profitability Ratio – Measures the company's degree of achievement in operation			
10	Cash flow from operating activities (CFFO) to net income (NI)	CFFO/NI	Measures the collectivity of net income, indicates by percentage of net income converted into cash.	Schmidgall et al. (1993) Ryu and Jang (2004) Jooste (2007) Ibarra (2009)
11	Cash flow from operating activities (CFFO) to total revenue (TR)	CFFO/TR	Shows the company's ability to translate total revenue into cash.	Schmidgall et al. (1993) Ryu and Jang (2004) Murty and Misra (2004) Jooste(2007) Ibarra(2009)

3.3 Model of the study

The current study employs logistic regression analysis to achieve the research objective. Logistic regression analysis is used to construct and test the financial distress prediction model. Logistic regression analysis is a type of regression for making predictions when the dependent variables are categorical. Logistic regression is the appropriate statistical technique when the dependent variable is a categorical nominal and non-metric and independent variables are metric variables (Hair et al., 2006). They claimed that logistic regression is also less affected and more robust than Multiple Discriminant Analysis (MDA) when the assumption of multivariate normality is not achieved. The dependent variable in this study can be categorized into distressed and non-distressed companies. The dependent variable is coded as 1 for distressed companies and 0 for non-distressed companies.

Logistic regression analysis enables the users to classify the companies as distressed or non-distressed according to their probability estimates. The probabilities estimates are calculated using the coefficient estimates of the independent variables in the logistic regression model. A firm with probability estimates above the selected cut-off point will be classified as distressed companies. The use of cut-off point is to minimize the misclassification rates. This study uses cut-off point of 0.5 for financial distress probabilities which is consistent with Tew and Enylina (2005).It means that the companies are classified as distressed companies if the probability calculated is equal and more than 0.5.On the other hand, the companies are classified as non-distressed companies if the probabilities calculated are less than 0.5.

The data for prediction model of year-1, year-2 and year-3 are lagged one, two and three years prior the financial distress year respectively. The following financial distress prediction model is developed for the current study:

$$P(DISTRESS) = 1/\{1 + \exp[-(\beta 0 + \beta 1\,(CFFO/CL) + \beta 2\,(CFFO\text{-}I/I) + \beta 3\,(CFFO/TL) + \beta 4\,(CFFO/LTL) + \beta 5\,(CFFI/TL) + \beta 6\,(CFFF/TL) + \beta 7\,(CFFO/SHE) + \beta 8\,(CFFO/TA) + \beta 9\,(CFFO/FA) + \beta 10\,(CFFO/NI) + \beta 11\,(CFFO/TR)]\}$$

Where:

P (DISTRESS)	=	the probability that a company experiences financial distress
exp	=	exponential function
CFFO/CL	=	the cash flow from operating activities/current liabilities
CFFO+I/I	=	the cash flow from operating activities+ interest/interest
CFFO/TL	=	the cash flow from operating activities/ total liabilities
CFFO/LTL	=	the cash flow from operating activities/ long-term liabilities
CFFI/TL	=	the cash flow from investing activities/ total liabilities
CFFF/TL	=	the cash flow from financing activities/ total liabilities
CFFO/SHE	=	the cash flow from operating activities/ shareholders' equity
CFFO/TA	=	the cash flow from operating activities/ total asset
CFFO/FA	=	the cash flow from operating activities/ fixed asset
CFFO/NI	=	the cash flow from operating activities/ net income
CFFO/TR	=	the cash flow from operating activities/ total revenue

4. Findings

4.1 Logistic regression analysis results

CFFO/CL under liquidity ratio was excluded from the logistic regression analysis due to multicollinearity problem. Table 2 shows that CFFO/TL and CFFO/TR are significant at 1 percent level. Meanwhile, CFFO+I/I, CFFO/LTL and CFFI/TL are significant at 5 percent level. The results explained that there is a significant relationship between cash flow ratios and financial distress. The findings of the current study indicate that CFFO/TR and CFFO/TL are the most significant predictors of financial distress. The later findings are consistent with Low et al. (2001), Murty and Misra (2004), Jooste (2007), Ong et al. (2011) and Yap et al. (2012). The findings of the current study concluded that solvency and profitability ratios are significant predictors of financial distress as distress companies are normally associated with highly leverage companies. Besides, revenue is the most favorable avenue to manipulate the earning for distress companies.

Based on the coefficient results, CFFO/TR has a significant positive relationship with financial distress. This indicates that the company is likely to face financial distress if the increase in sales is not translated into the increase in cash. The possible explanations for this scenario are fictitious sales and the increasing sales may be followed by the increase in account receivables. This situation could be used to detect any fictitious sales made by the company which show an increase in total revenue paired with insufficient cash flow. Besides, the company that had increased the sales figure but failed to replace its stock due to insufficient cash generated from its asset, may also possibly fall into financial distress situations.

Table 2. Logistic Regression Analysis Results

Variables	Coefficient (B)	Standard Error	Significance
Solvency Ratio			
CFFO + I/I	-1.292	0.505	0.010*
CFFO/TL	-5.398	1.496	0.000**
CFFO/LTL	0.850	0.338	0.012*
CFFI/TL	-0.576	0.236	0.015*
CFFF/TL	-0.032	0.247	0.898
CFFO/SHE	0.118	1.002	0.851
Efficiency Ratio			
CFFO/TA	3.180	1.775	0.703
CFFO/FA	-0.860	0.575	0.135
Profitability Ratio			
CFFO/NI	-0.349	0.316	0.270
CFFO/TR	2.562	0.636	0.000**
Model Chi-Square	193.082 (df 10 and significance at p value < 0.05)		
Model Cox& Snell R Square	0.461		
Model Nagelkerke R Square	0.615		
Hosmer&Lemeshow Test (Chi-square)	12.514 (df 8 and not significance at p value >0.05)		

** significant at 0.01 level,* significant at 0.05 level

Next, CFFO/TL has a significant negative relationship with financial distress. This indicates that, when there is greater cash generated from operating activities to meet its maturing obligation in the long run, the lower the probability of the company to go into financial distress. When the company has more cash available than its liabilities, it will less likely face financial distress situations (Ong et al., 2011). Therefore, insufficient cash flow for the repayment of total debt may signal a potential problem of being a going concern for the distressed companies. Thus, distressed companies could be associated with highly leverage companies.

In addition, CFFI/TL has a significant negative relationship with financial distress. This shows that, when there is greater cash generated from investing activities to meet the company's obligation in the long run, the lower the possibility of a company to go into financial distress. Thus, the distressed companies are unlikely to generate cash from selling its asset and other investments to pay its total debt.

Furthermore, CFFO+I/I also have a significant negative relationship with financial distress. The higher the ratio, the lower the probability of a company to slip into financial distress situations. It means that, the greater the amount of cash available to pay short-term and long-term interest payment on the entire debt, the lower the likelihood of the company to face financial distress situations. A highly leverage company is expected to suffer deterioration in the future ability to meet its interest payment as having cash flow problems, which is associated with distressed companies status.

Finally, CFFO/LTL was also found to have a significant positive relationship with financial distress. This indicates that the higher the ratio, the higher the possibility of a company to fall into financial distress situations. When the company has negative cash flow from operating activities, they might obtain outside sources to finance its long-term obligation. The additional sources should be used for operation purposes, not for financing its long-term debt. If this situation exists for a longer period, the company may be forced into financial distress or bankruptcy.

The results show that four of the significant ratios are categorized under solvency ratio and one under profitability ratio. Thus, we can conclude that solvency and profitability ratios have significant relationships with financial distress. Besides, from the discussion above, financial distress is closely related to the companies that have cash flow problems to meet its obligation in the long run, to pay interest payment on the entire debts and are likely to inflate total revenue though suffering insufficient cash flow.

The Omnibus test of model coefficient shows that chi-square statistics is 193.082 with highly significant p-value at 0.000 which is below than 0.05.This suggests that the model is significant (Pallant, 2011).Next, by referring to the Hosmer and Lemeshow test results, the chi-square value is 12.514 with a significant p-value level of 0.130. This value is larger than 0.05.Thus, indicating that the logistic regression model used in the current study fits the data (Pallant, 2011).

In addition, the model summary that includes the results of Cox & Snell R Square and Nagelkerke R Square was also reviewed. Cox & Snell R Square and Nagelkerke R Square are Pseudo R Square that indicates the proportion of variation in the dependent variable explained by the independent variables. The closer the value is to one, the better the model (Pallant, 2011). Table 4.2 shows that the values for Cox & Snell R Square and NagelkerkeR Square in this study are 0.461 and 0.615 respectively. Here, both values are closer to one, which indicate that the model is good.

4.3 Probabilities of financial distress

The coefficient estimates for the independent variables in the regression model used to calculate the probabilities of financial distress for both distressed and non-distressed companies for the three years prior the actual distress years. The probability of financial distress varies between 0 to 1. The cut-off value of 0.5 is used to differentiate between distressed and non-distressed companies if the predicted probabilities calculated fall within the range of 0 to 1. If the predicted probabilities are greater than 0.5, then the predicted group is distress companies. Meanwhile, if the value is less than 0.5, then the predicted group is non-distressed companies.

The results are encouraging as it correctly predicted the distressed companies that were involved in financial irregularities such as Axis Incorporation Bhd, Transmile Group Bhd, Fotronics Corporation Bhd, Oilcorp Bhd, HoHup Bhd, Trinity Bhd (formerly known as Talam Corporation Bhd) and LFE Corporation Bhd up to three years prior the distress years.

4.4 Prediction accuracy of the model

Table 3 shows that the logistic regression model used in the current study correctly classified 82.1 percent of the overall cases, which are higher than Tew and Enylina (2005) that reported only 80.9 percent. The results depict that 84.6 percent of distress companies are correctly classified and 79.5 percent of non-distressed company are correctly classified. The low percentage of accuracy in classifying non-distressed companies may be because a few of them are suffering negative cash flows. Thus, the model used in the current study can be considered as fit to be used in differentiating between distressed and non-distressed companies.

Table 3. Prediction Model

		Predicted		
		Financial Distress		Percentage Correct
Observed		Distress	Non-Distress	
Financial Distress	Distress	132	24	84.6
	Non-Distress	32	124	79.5
Overall Percentage				82.1

5. Conclusion

The current study had successfully achieved the research objective that had been established in the earlier chapter. The current study seeks to examine whether there is a significant relationship between cash flow ratios and financial distress. The objective had been analyzed using the logistic regression model. The results indicate that there are five cash flow ratios that documented significant relationships with financial distress. This includes CFFO+I/I, CFFO/TL, CFFI/TL and CFFO/TR. This suggests that highly leverage companies that have cash flow problems to serve their obligation in the long run, to pay interest payment on the entire debt, and are more vulnerable to inflate their total revenue, are likely to fall into financial distress situations.

In addition to the above findings, the results from the logistic regression analysis also demonstrates that the model used in the current study fits the data based on the results of the Omnibus test of model coefficients, Hosmer & Lemeshow test, Cox & Snell R Square and Nagelkerke R Square. Furthermore, based on the classification accuracy of year one until year three, the results are encouraging that the model can be used up to three years prior the distress years. On top of that, a few financially distressed companies that are involved with the recent financial irregularities included in this study were correctly predicted up to three years prior the distress years. Moreover, the overall percentage of correctly classified sample cases at 82.1 percent indicates that the model is accurate in discriminating distressed and non-distressed companies.

Thus, the conclusions that can be drawn from the current study are solvency and profitability ratios that are based on cash flow variables have significant relationships with financial distress. Lastly, the logistic regression model is an accurate and reliable statistical tool to predict financial distress in the Malaysian environment up to three years prior the actual distress years.

The findings of this study may provide additional evidence to the literature proving that cash flow ratio is significantly important to predict financial distress in Malaysia. The significant results from the findings is expected to be useful to various classes of users such as shareholders, investors, creditors, financial institutions, auditors, managers, policy makers, regulators, etc. Both investors and shareholders are the most affected parties if the company is forced into bankruptcy. Therefore, the findings from this study can be used to evaluate the company's financial performance and position besides to predict the company prospects in the near future. Auditors might be interested on this study to assess the going concern status of the analysed companies, which might be their important current or potential client. Managers would be interested in this study because the findings can be used as a tool for corrective action besides for planning and controlling current business affairs. Policy makers and regulators could use the findings from this study to make corrective actions to mitigate corporate failure (Tew and Enylina, 2005). Financial institutions and creditors might be interested to assess the company’s credit worthiness before granting any credit facilities.

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